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AQUATIC INVERTEBRATES AND HABITAT AT A FIXED STATION ON THE JUDITH RIVER, FERGUS COUNTY, MONTANA

July 9, 2001

A report to
the Montana Department of Environmental Quality
Helena, Montana

by
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INTRODUCTION

This report is one of 38 brief interpretive summaries of data assembled as part of a statewide, multi-year study conducted by the Montana Department of Environmental Quality (MT DEQ). Each report discusses information generated from a single benthic invertebrate sample collection and habitat evaluation at a fixed station established on a gauged river or high-order tributary. The present treatise focuses on the aquatic community sampled on the Judith River on July 9, 2001. The sample site was located by GPS reading at 47° 39' 49" N, 109° 38' 59" W, lying within the Northwestern Great Plains Ecoregion (Woods et al. 1998). The sample was collected by personnel of MT DEQ. Sampling effort consisted of either a composite of four Hess samples, or a one-minute kicknet collection (Bukantis 1998). Habitat parameters were evaluated using the MT DEQ Macroinvertebrate Habitat Assessment Field Form for streams with riffle/run prevalence. Invertebrate samples were processed and animals identified by Rhithron Associates, Inc. Analysis of invertebrate assemblages was accomplished by applying the method recommended by Bukantis (1998) for streams of Montana's Plains ecoregions. The method uses a multimetric battery to evaluate disturbance to biotic integrity. Results from the application of other metric batteries may be found in the Appendix.

RESULTS AND DISCUSSION

Table 1 itemizes the evaluated habitat parameters and shows the assigned scores for each, as well as the integrated score and condition category.

Overall habitat conditions scored optimally at this site on the Judith River. Moderate sediment deposition was noted, and the flow status was perceived to be sub-optimal. Some streambank instability was observed; erosion on outside bends was described.

Table 1. Stream and riparian habitat assessment for a fixed station on the Judith River. July 2001.

Max. possible score	**Parameter**	Judith River
10	Riffle development	9
10	Benthic substrate	10
20	Embeddedness	18
20	Channel alteration	19
20	Sediment deposition	10
20	Channel flow status	15
20	Bank stability: left / right	7 / 9
20	Bank vegetation: left / right	10 / 10
20	Vegetated zone: left / right	10 / 10
160	Total	137
	Percent of maximum CONDITION*	**86** **OPTIMAL**

*Condition categories: Optimal > 80% of maximum score; Sub-optimal 75 - 56%; Marginal 49 - 29%; Poor <23%. Adapted from Plafkin et al. 1998.

Table 2. Metric values, scores, and bioassessment for a fixed station on the Judith River. The Montana DEQ bioassessment metric battery recommended for streams of the Plains ecoregions (Bukantis 1998) was used for the evaluation. July 2001.

	Judith River	
METRICS	**METRIC VALUES**	**METRIC SCORES**
Taxa richness	17	1
EPT richness	12	3
Biotic index	3.67	3
% Dominant taxon	38.04	2
% Collectors	87.73	1
% EPT	90.80	3
Shannon diversity	2.48	2
% Scrapers and Shredders	3.07	1
Predator taxa	4	2
% Multivoltine	14.88	3
	TOTAL SCORE (max.=30)	21
	PERCENT OF MAX.	**70**
	Impairment classification	**SLIGHT**
	USE SUPPORT	**PARTIAL**

Bioassessment results are given in Table 2. When this bioassessment method is applied to these data, scores indicate that this site on the Judith River is slightly impaired and only partially supports designated uses. However, low abundance of organisms in the sample complicates the evaluation; conclusions and interpretation of results are tenuous. Whether the inadequacy of the sample was due to a depauperate community at the site or to sampling bias is not entirely clear from the data; however, there is some evidence that flow conditions may have influenced the taxa collected. No midges were present in the assemblage, suggesting that flow may have been higher than is typical for the season at the time of sampling.

Taxa richness seemed to be good, given the low number of animals in the sample. The biotic index value (3.62) for the assemblage collected was quite low, suggestive of good water quality. Three stonefly taxa were collected, which suggests that reach-scale habitat features were essentially intact. Nine "clinger" taxa represented 88% of all animals in the sample; fine sediment deposition did not obliterate hard substrate habitats completely.

CONCLUSIONS

- The low number of organisms in the sample renders bioassessment unreliable. But taxa richness, the biotic index value, and the taxonomic composition of the assemblage appeared to give evidence of good water and habitat quality.

LITERATURE CITED

Bukantis, R. 1998. Rapid bioassessment macroinvertebrate protocols: Sampling and sample analysis SOP's. Working draft, April 22, 1997. Montana Department of Environmental Quality. Planning Prevention and Assistance Division. Helena, Montana.

Woods, A.J., Omernik, J. M. Nesser, J.A., Shelden, J., and Azevedo, S. H. 1999. Ecoregions of Montana. (Color poster with map, descriptive text, summary tables, and photographs) Reston, Virginia. US Geological Survey.

APPENDIX

Taxonomic data and summaries

Judith River

July 2001

Aquatic Invertebrate Taxonomic Data

Site Name: Judith River **Date: 7/09/01**

Site ID: M23JUDR01 Approx. percent of sample used 100

Taxon	Quantity	Percent	HBI	FFG
Pisidium sp.	1	0.61	8	CF
Total Misc. Taxa	**1**	**0.61**		
Acentrella insignificans	3	1.84	4	CG
Baetis tricaudatus	1	0.61	4	CG
Rhithrogena sp.	1	0.61	0	CG
Tricorythodes minutus	9	5.52	4	CG
Total Ephemeroptera	**14**	**8.59**		
Acroneuria sp.	1	0.61	2	PR
Isogenoides sp.	3	1.84	3	PR
Pteronarcella sp.	1	0.61	0	SH
Total Plecoptera	**5**	**3.07**		
Brachycentrus occidentalis	62	38.04	2	CF
Culoptila sp.	2	1.23	1	SC
Hydropsyche sp.	55	33.74	5	CF
Hydroptila sp.	9	5.52	6	PH
Mayatrichia sp.	1	0.61	6	SC
Total Trichoptera	**129**	**79.14**		
Microcylloepus sp.	1	0.61	5	SC
Ordobrevia sp.	11	6.75	5	CG
Total Coleoptera	**12**	**7.36**		
Atherix sp.	1	0.61	4	PR
Dicranota sp.	1	0.61	3	PR
Total Diptera	**2**	**1.23**		
Grand Total	**163**	**100.00**		

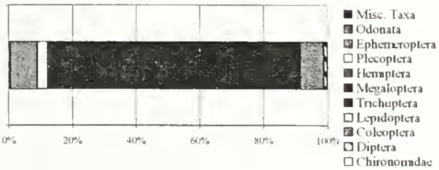
Aquatic Invertebrate Summary

Site Name: Judith River **Date: 7/09/01**

SAMPLE TOTAL	163
EPT abundance	148
TAXA RICHNESS	17
Number EPT taxa	12
Percent EPT	90 80

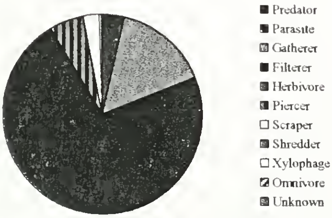
TAXONOMIC COMPOSITION

GROUP	PERCENT	#TAXA	ABUNDANCE
Misc Taxa	0 61	1	1
Odonata	0 00	0	0
Ephemeroptera	8 59	4	14
Plecoptera	3 07	3	5
Hemiptera	0 00	0	0
Megaloptera	0 00	0	0
Trichoptera	79 14	5	129
Lepidoptera	0 00	0	0
Coleoptera	7 36	2	12
Diptera	1 23	2	2
Chironomidae	0 00	0	0



FUNCTIONAL COMPOSITION

GROUP	PERCENT	#TAXA	ABUNDANCE
Predator	3 68	4	6
Parasite	0 00	0	0
Gatherer	15 34	5	25
Filterer	72 39	3	118
Herbivore	0 00	0	0
Piercer	5 52	1	9
Scraper	2 45	3	4
Shredder	0 61	1	1
Xylophage	0 00	0	0
Omnivore	0 00	0	0
Unknown	0 00	0	0



COMMUNITY TOLERANCES

Sediment tolerant taxa	2
Percent sediment tolerant	6 13
Sediment sensitive taxa	0
Percent sediment sensitive	0 00
Metals tolerance index (McGuire)	3 83
Cold stenotherm taxa	0
Percent cold stenotherms	0 00

Site ID: M23JUDR01

DOMINANCE

TAXON	ABUNDANCE	PERCENT
Brachycentrus occidentalis	62	38 04
Hydropsyche sp	55	33 74
Ordohrevia sp	11	6 75
Tricorythodes minutus	9	5 52
Hydroptila sp	9	5 52
SUBTOTAL 5 DOMINANTS	146	89 57
Acentrella insignificans	3	1 84
Isogenoides sp	3	1 84
Culoptila sp	2	1 23
Pisidium sp	1	0 61
Baetis tricaudatus	1	0 61
TOTAL DOMINANTS	156	95 71

SAPROBITY

Hilsenhoff Biotic Index	3 67

DIVERSITY

Shannon H (loge)	1 72
Shannon H (log2)	2 48
Simpson D	0 27

VOLTINISM

TYPE	ABUNDANCE	PERCENT
Multivoltine	24	14 88
Univoltine	63	38 50
Semivoltine	76	46 63

TAXA CHARACTERS

	#TAXA	ABUNDANCE	PERCENT
Tolerant	4	20	12 27
Intolerant	0	0	0 00
Clinger	9	143	87 73

BIOASSESSMENT INDICES

B-IBI (Karr et al)

METRIC	VALUE		SCORE	
Taxa richness	17		1	
E richness	4		1	
P richness	3		1	
T richness	5		3	
Long-lived	2		1	
Sensitive richness	0		1	
%tolerant	12 27		5	
%predators	3 68		1	
Clinger richness	9		1	
%dominance (3)	78 53		1	
		TOTAL SCORE	16	32 %

MONTANA DEQ METRICS (Bukantis 1998)

METRIC	VALUE	Plains Ecoregions	Valleys and Foothills	Mountain Ecoregions
Taxa richness	17	1	1	0
EPT richness	12	3	1	0
Biotic Index	3 67	3	3	2
%Dominant taxon	38 04	2	2	1
%Collectors	87 73	1	1	0
%EPT	90 80	3	3	3
Shannon Diversity	2 48	2		
%Scrapers +Shredd	3 07	1	0	0
Predator taxa	4	2		
%Multivoltine	14 88	3		
%H of T	42 6		3	
TOTAL SCORES		21	14	6
PERCENT OF MAXIMUM		70 00	58 33	28 57
IMPAIRMENT CLASS		SLIGHT	SLIGHT	MODERATE